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Evaluation of Decay Curves of a Chemical Species Undergoing Simultaneous First- and Second-Order Decay

Tables which facilitate determining, from two measured half-lives, the first- and second-order components of the decay curve of a chemical species have been derived.

In pulse-radiolysis studies, the formation and decay of transient chemical species are directly observed on an oscilloscope. The traces can be used for calculating the rate constant for a first- (pseudo or real) or second-order reaction of the species under investigation. For a pure first- or second-order reaction, the usual evaluation method involves plotting, respectively, the logarithm or the reciprocal of the concentration against time, and measuring the slope of the resultant straight line. This procedure can also be used for a predominantly second-order decay with a small first-order component, or vice versa, for which there is a small deviation from the straight line at one end of the curve.

However, if the first- and second-order components are of the same order of magnitude, analyzing the decay curves is more complex. The tables, computed with an IBM-1620 digital computer, enable fast calcu-

lation of the first- and second-order rate constants from two half-lives and the corresponding initial concentrations, obtained from either one or two decay curves.

Note:

The following documentation may be obtained from:

National Technical Information Service
Springfield, Virginia 22151
Single document price \$3.00
(or microfiche \$0.65)

Reference:

ANL-7400 (N68-25700), Tables for the Evaluation of Decay Curves of a Chemical Species Undergoing Simultaneous First- and Second-Order Decay

Source: K.H. Schmidt of
Argonne National Laboratory
(ARG-10281)

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